JRC141990

European Commission

SCIENCE FOR POLICY BRIEF

A regional resilience dashboard for the EU

HIGHLIGHTS

→ Modelled after the Commission's Resilience Dashboards, the Regional Resilience Dashboard indicates significant disparities of capacities and vulnerabilities among regions within each country.

→ There is a strong negative correlation between capacities and vulnerabilities among regions within each country confirming that regions with heightened vulnerabilities frequently possess diminished capacities, and vice versa.

→ Regions situated at the EU's periphery, particularly in South-Eastern Europe, exhibit lower capacity and heightened vulnerability indices while urban regions and those encompassing national capitals show higher capacities and reduced vulnerabilities.

→ Between 2017 and 2023 vulnerabilities diminished and capacities improved slightly across all EU regions. At the same time, inequalities in resilience across regions increased.

→ A regional resilience dashboard is a powerful tool to visualise and assess each European region's capabilities and vulnerabilities and guide policymakers.

REGIONAL RESILIENCE: WHY AND WHAT

This brief introduces **the Regional Resilience Dashboard (RRDB),** which extends the European Commission's Resilience Dashboard (RDB) framework to the NUTS2 regional level.

Measuring resilience at this scale is key to capturing socio-economic and geographic disparities across the EU and identifying the specific vulnerabilities and strengths of individual regions.

The need for enhanced resilience has become increasingly evident in the wake of recent crises. The COVID-19 pandemic and the 2020 Strategic Foresight Report[1] highlighted the importance of embedding **resilience as a core principle of EU policymaking** to better prepare for future shocks and support transitions in a fair, sustainable and democratic way.

While current tools such as the RDB assess resilience at the national level, they often **overlook significant regional differences.** Strengthening resilience therefore requires targeted regional strategies aligned with EU priorities.

Resilience assessments (concretely, the assessment of **vulnerabilities** and **capacities** of regions) help anticipate and manage complex societal transformations by identifying how EU regions absorb, adapt, and evolve in the face of disruption or transition.

[1] 2020 Strategic Foresight Report: Charting the course towards a more resilient Europe (COM(2020) 493).

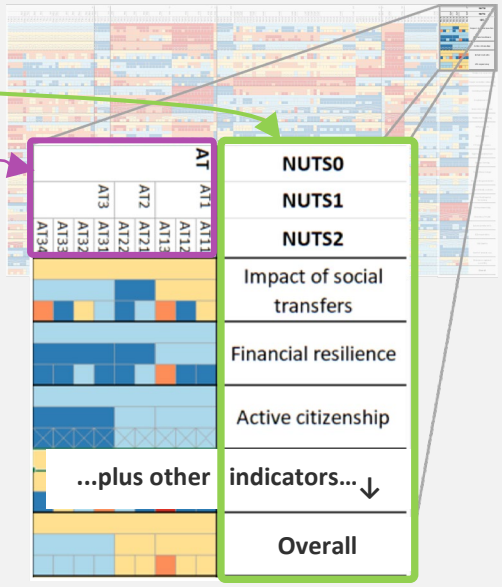
Joint Research Centre

Box 1: The Regional Resilience Dashboard: what it is and how to read it.

The European Commission's 2020 Strategic Foresight Report (SFR) defines resilience as "the ability not only to withstand and cope with challenges, but also to undergo transitions in a fair and democratic manner".

Following the prototype dashboards in the 2020 SFR, the final Resilience Dashboards[2] (RDB) were launched in 2021. They aim to provide a holistic assessment of resilience in the EU and its Member States in relation to ongoing societal transformations and challenges ahead.

The Regional Resilience Dashboard (RRDB) provides this information at regional level as a matrix in which each one of the **24 vulnerability and 27 capacity indicators** are presented in rows, while **regions** are displayed in columns.



The RRDB features the resilience score (= relative position of the indicator in the respective region compared to all other regions) for each indicator for the latest available year. The RRDB provides **three regional disaggregation levels** (NUTS0; NUTS1; NUTS2). Finally, the median across vulnerability or capacity indicators gives the **overall** "synthetic" capacity or vulnerability index in the last row. The full dashboards are included in the technical report.[3]

Following closely the methodology of the RDB[4], the RRDB distinguishes:

- **Vulnerabilities**: features that can exacerbate the negative impact of crises and transitions, or obstacles that may hinder the achievement of long-term strategic goals (e.g. young people neither in employment not in education and training, share of jobs at risk of automation) and
- **capacities**: enablers, facilitating elements or abilities to cope with crises and structural changes and to manage transitions (e.g. share of adults in training, financial resilience of households).

The dashboard uses a five-colour scale to visualise each region's 'resilience score' for every indicator, as illustrated in *Figure 1* below.

Vulnerabilities	Capacities	To read the colours, treat the resilience score like a % ranking
Bottom 20% (<20%)	Top 20% (>80%)	**dark blue** indicates regions whose **capacities** are located in the top 20% of the overall distribution (an indicator position above 20%)
20%-40%	60%-80%	**light blue** indicates regions whose **capacities** fall between the 20th and 40th percentile
40%-60%	40%-60%	**yellow** indicates regions whose **capacities** fall between the 20th and 40th percentile of the reference sample
60%-80%	20%-40%	**light orange** indicates regions whose **capacities** are between the bottom 20% and 40% of the reference data
Top 20% (>80%)	Bottom 20% (<20%)	**dark orange** indicates regions whose **capacities** are in the bottom 20% of the reference data
The colour scheme for **vulnerabilities** is the exact opposite, with low vulnerabilities displayed in **dark blue** and high vulnerabilities in **dark orange.**		

This score reflects the region's relative position within the overall distribution of values across all regions, based on the most recent data available for each indicator (typically from 2023).

Figure 1 *– Colour scheme to visualise low to high vulnerabilities and high to low capacities.*

[2] Resilience Dashboards - European Commission

[3] See [3] in "References"

[4] See [1] in "References"

Choice of indicators

A key objective of the regional resilience dashboard is to capture vulnerabilities and capacities in a holistic way, covering different areas of resilience such as:

- Economic and financial stability
- Inequalities and social impact of the transitions
- Health, education and work
- Green
- Institutions
- Digital

The various vulnerability and capacity indicators were selected to address these different areas of resilience, with 24 indicators used to capture vulnerabilities and 27 as capacities (see *Figure 2*).

To assess the impact of policies on enhancing resilience over time, all relevant indicators have been systematically compiled for the period spanning 2017 to 2023.

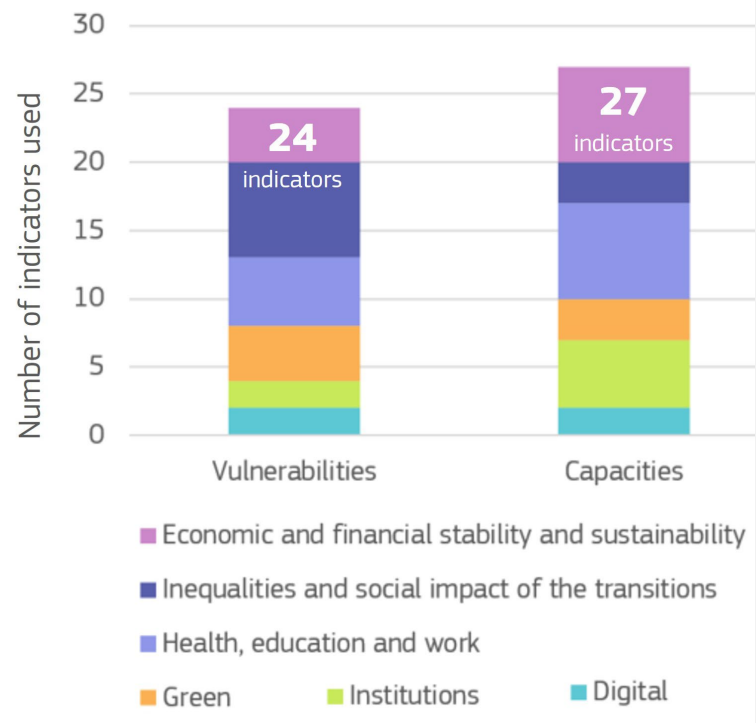


Figure 2 *above shows the distribution of vulnerabilities and capacities in these different areas.*

Data collection and missing values

The careful collection of data was essential due to the limited availability of indicators for EU regions, with approximately 10% of data missing at the NUTS2 level. In instances where data was unavailable for certain regions, imputation was necessary to compute the regional resilience score[5]. Priority was placed on open access and high-quality data, resulting in Eurostat being the primary source for most indicators in the RRDB, supplemented by a smaller portion of indicators from alternative data sources.

REGIONAL RESILIENCE

The 2023 Regional Resilience Dashboard can be summarized by the synthetic capacity and vulnerability indices which are depicted in maps at the NUTS2 level (see *Figure 3* for the capacity index and *Figure 4* for the vulnerability index on next page).

The primary insight is the **significant disparity** in capacities and vulnerabilities among regions within each country.

Many **regions across Northern and Central Europe exhibit medium to high capacities**, with the Western Netherlands and Prague displaying particularly robust capacities.

Conversely, several **regions in Southern and Eastern Europe have potential to enhance** their capacities.

There is a **general tendency for the regions with the national capital to have higher capacities** than other regions within the country, notably in the Czech Republic, Denmark and Finland. Overseas regions show the lowest capacity overall. A closer look at capacities (see [3]) shows that labour productivity, investment and quality of government are key factors, with implications for regional policy.

[5] For further details on the methodology and imputation procedures at different NUTS-levels, see [3] in "References".

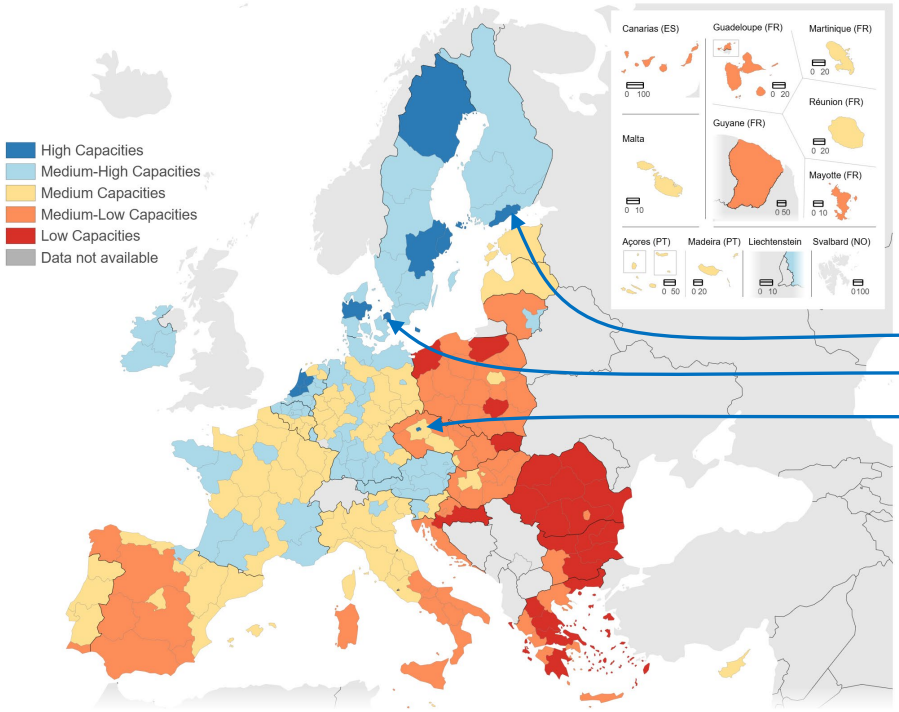


Figure 3– Capacities at NUTS2 level for 2023

There is a general tendency for the regions with the national capital to have higher capacities than other regions within the country, notably in:

- **Finland**
- **Denmark** and
- **Czech Republic.**

Source: JRC calculations based on the Regional Resilience Dashboard.
Note: The figure depicts the overall capacity index for each NUTS2 region.

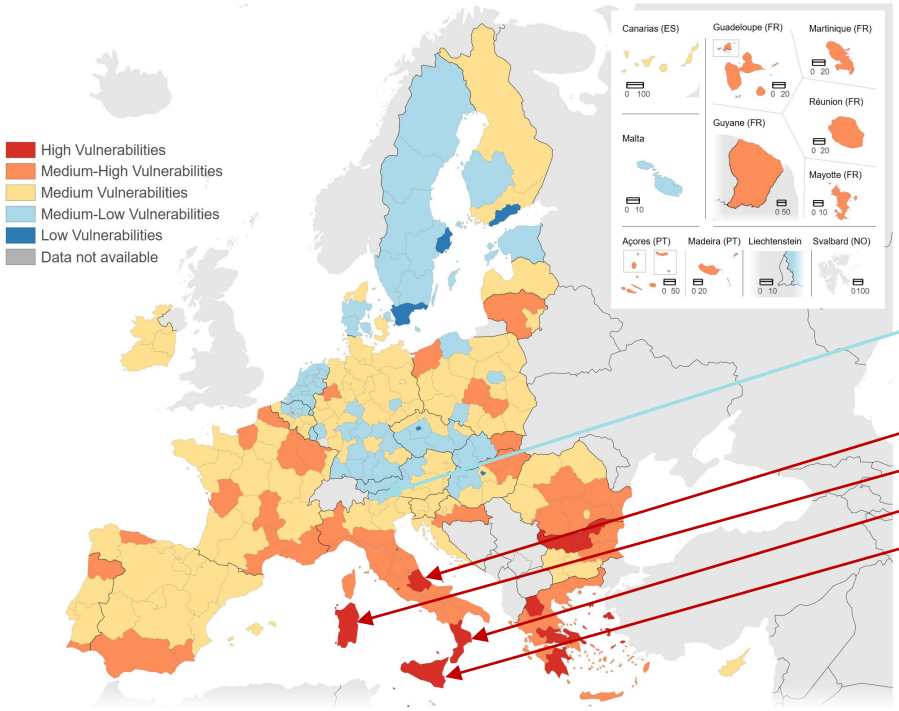


Figure 4 – Vulnerabilities at NUTS2 level for 2023

On the vulnerability side, most regions show medium levels, but vulnerabilities are notably higher in Eastern and Southern Europe.

Intra-country differences are significant — in Italy, for example, **South Tyrol** (ITH1) has medium-low vulnerabilities, whereas

- **Abruzzo** (ITF1),
- **Sardinia** (ITG2),
- **Calabria** (ITF6) and
- **Sicily** (ITG1),

show high vulnerabilities, revealing disparities that are hidden when only viewing Italy's national vulnerability score.

Source: JRC calculations based on the Regional Resilience Dashboard.
Note: The figure depicts the overall vulnerability index for each NUTS2 region.

Eastern European border regions are generally more vulnerable even if they are located in countries with low vulnerabilities. For example, the Finnish regions bordering Russia are more vulnerable than other Scandinavian regions. Overall, the vulnerability map presents fewer extreme values than the capacity map, indicating a closer alignment among regions in terms of vulnerability[6].

Comparing the two maps suggests a correlation between capacity and vulnerability indices; **regions with high capacities often correspond to low vulnerabilities,** and vice versa. Extreme disparities in vulnerability tend to be smaller across European regions, with a greater number of regions falling into the middle categories (see *Figure 4*).

6 Further analysis (see [3] in "References") shows that reducing the number of young people neither in employment nor training and increasing internet use are key to reducing vulnerabilities and should be policy priorities.

REGIONAL RESILIENCE DISPARITIES

A closer examination of within-country disparities in the capacity index reveals notable differences both across regions and in comparison to national averages. *Figure 5* shows substantial variation in capacity indices between and within countries.

Most EU countries display varying levels of intra-national capacities. Spain, France, and Italy stand out for their regional heterogeneity, with some areas showing high capacities and others much lower ones. In Czechia, the capital region has high capacities, while other regions remain at medium or medium-low levels.

Similarly, in Bulgaria, Greece, Poland, Hungary, Ireland, Finland, and Sweden, capital regions rank highest in the capacity index. Despite these internal differences, regional and national resilience levels remain strongly correlated. Northern and western European regions tend to be more resilient than those in the south and east.

Regarding vulnerabilities, *Figure 6* shows that regional values tend to align more closely with national vulnerability scores. Still, countries like Slovakia, Hungary, and Italy reveal notable regional gaps, with some areas combining high capacities and high vulnerabilities.

As with capacities, capital regions are usually the most resilient, showing the lowest vulnerabilities in Sweden, Finland, Denmark, Czechia, Hungary, Lithuania, and Poland. A clear pattern emerges as regions with national capitals tend to be less vulnerable and have higher capacities than others—a trend shown by green dots (●) in *Figures 5 and 6.*

Noteworthy exceptions include Austria and Belgium, where the capital region exhibits higher vulnerabilities than the national level.

In terms of capacities, capital regions in Romania, Slovenia, Germany, and Denmark exhibit slightly lower capacities than the national average.

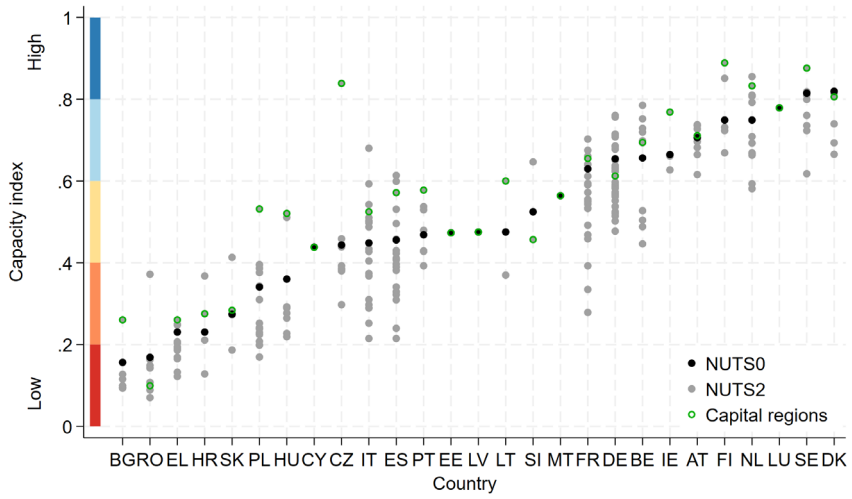


Figure 5 – Capacity dispersion - NUTS0 versus NUTS2

Most EU countries exhibit varying degrees of intra-national capacity dispersion, with some regions possessing elevated capacities while others demonstrate lower capacities.

Source: JRC calculations.
Note: The figure depicts the overall capacity index for each NUTS2 and NUTS0 region. NUTS0 indices represent the country's aggregated level of capacities rather than representing the average of the countries' regions.

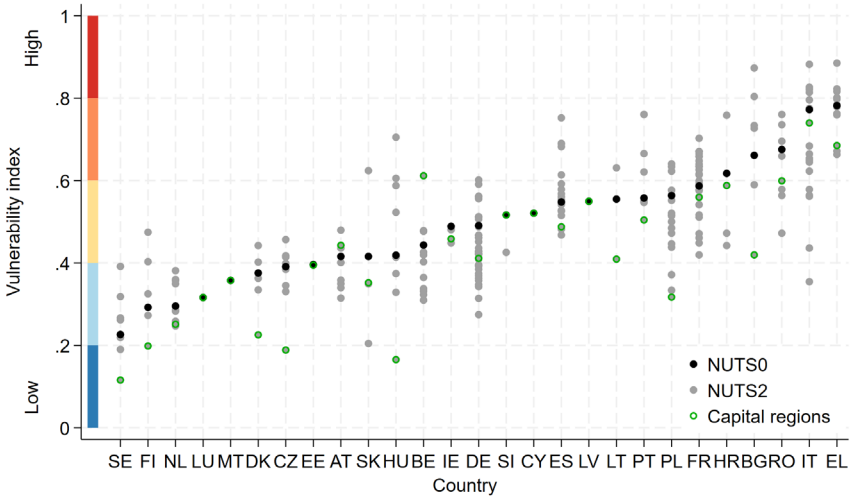


Figure 6 – Vulnerability dispersion - NUTS0 and NUTS2

Several countries such as Slovakia, Hungary, and Italy show significant regional disparities, with some regions exhibiting high vulnerabilities alongside high capacities.

Source: JRC calculations.
Note: The figure depicts the overall vulnerability index for each NUTS2 and NUTS0 region. NUTS0 indices represent the country's aggregated level of vulnerabilities rather than representing the average of the countries' regions.

CORRELATION BETWEEN RESILIENCE INDICES

The negative correlation between vulnerabilities and capacities is significant, confirming the observation that regions with heightened vulnerabilities frequently possess diminished capacities, and vice versa.

Figure 7 highlights regions characterised by high vulnerabilities and/or low capacities in dark orange, illustrating that certain regions demonstrate particularly low resilience levels, which were not initially apparent in the analysis of national resilience. This is exemplified by the Italian regions of Sicily (ITG1), Northwestern Bulgaria (BG31) and the Greek Peloponnese (EL65).

Conversely, regions exhibiting low vulnerabilities and/or high capacities are highlighted in dark blue, with these positive examples predominantly situated in Scandinavia, notably in Finnish and Swedish regions, as well as in the Netherlands and Czechia.

GEOGRAPHIC CHARACTERISTICS

Regional resilience, as illustrated by the Regional Resilience Dashboard, is a function of numerous factors that shape a region's capacity to withstand shocks, adapt to changing conditions, and undergo transformation over time.

Certain factors, such as geographic location, are exogenous and cannot be changed by policy interventions. A regression analysis of regional characteristics reveals that factors such as population density, coastal or mountainous regions and being located at the EU's periphery all have a significant impact on regional resilience, as can be observed in the maps (see *Figure 3* and *Figure 4*). The detailed results are described in the forthcoming technical report[7].

Going into more detail, regions situated at the EU's periphery, particularly in South-Eastern Europe, exhibit lower capacity and heightened vulnerability indices. Conversely, greater distances from the capital of the European Union, Brussels, tend to diminish regional capacity (similar results pertain if we measure the distance from the EU's geographic centre, the EU's economic core).

Urban regions and those encompassing national capitals demonstrate higher resilience, exhibiting greater capacities and reduced vulnerabilities. Mountainous regions are notably more vulnerable, whereas coastal regions possess enhanced capacities.

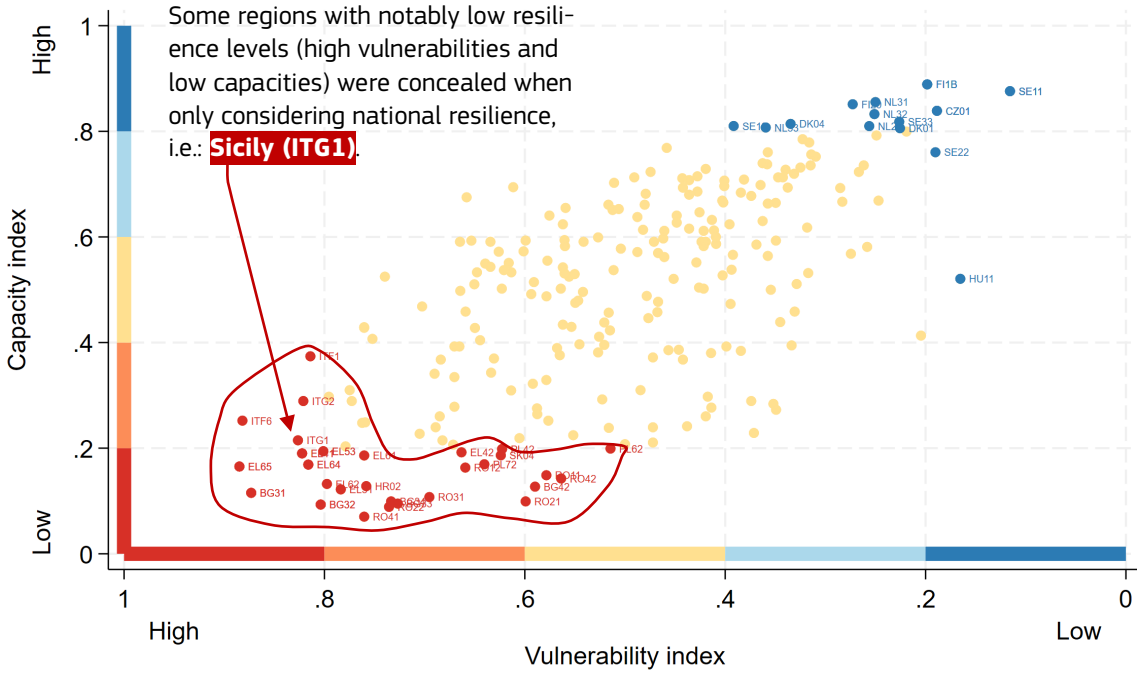
Figure 7 – Correlation between capacity and vulnerability synthetic indices (NUTS2)

Source: JRC calculations.

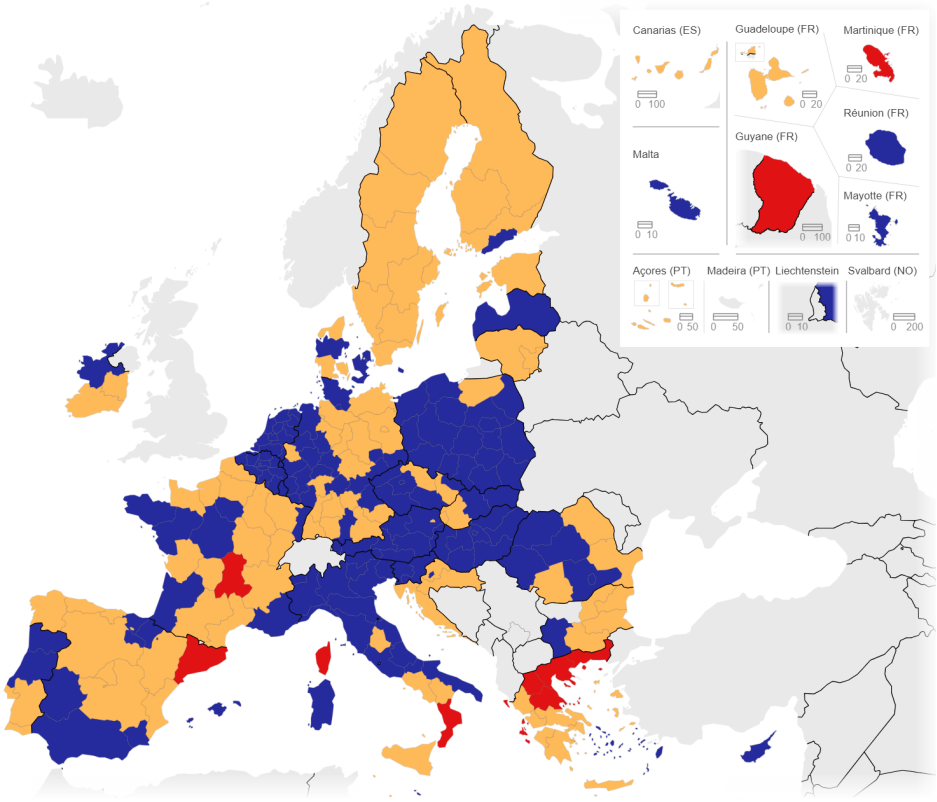
Note: Each dot represents one region and the corresponding position regarding its vulnerability and capacity indices.

The vulnerability index is reversed, ranging from highest to lowest vulnerability index. Regions in the lower left corner have both, low capacities and high vulnerabilities while regions in the upper right are characterised by low vulnerabilities and high capacities.

For convenience, some regions are labelled with their identifier.



[7] See [3] in "References".



Administrative boundaries: © EuroGeographics © UN–FAO © Turkstat
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Figure 8 – Changes in resilience 2017- 2023

The colour code indicates the change in each regions' vulnerability and capacity indices between 2017 and 2023.

Dark blue stands for an increase in capacities and a decrease in vulnerabilities.

Orange indicates a mixed picture, i.e. either capacities have increased and vulnerabilities at the same time or both have decreased.

Dark orange means that capacities have decreased while at the same time vulnerabilities have increased, leading to a lower level of resilience.

Source: JRC calculations

RESILIENCE OVER TIME

Regarding the evolution of resilience indices between 2017 and 2023, there is a disparity at regional level.

Several regions have demonstrated an enhancement in capacities alongside a reduction in vulnerabilities, (depicted in **blue** in *Figure 8*), indicating a favorable trend and elevated overall resilience.

Conversely, other regions have exhibited a combination of increased vulnerabilities and diminished capacities, (illustrated in **dark orange** in *Figure 8*). Importantly, most regions facing this decline in resilience are already among the most vulnerable ones, highlighting a growing disparity in resilience levels.

Most European regions display a mixed trend, with some regions encountering augmented vulnerabilities while others have increased their capacities (shown in **orange** in *Figure 8*).

Overall capacities and vulnerabilities both slightly improved over the last years but in general the EU average remains at median range.

Figure 9 (next page) illustrates the evolution of variability of the vulnerability and capacity indices at the regional level (encompassing all EU regions in the *Total variance*), within individual countries *(Within country variance),* and across countries *(Between country variance).*

While the total variance has increased slightly over the last few years, this is driven by the across country variation rather than by the within-country variance, which remained stable over the years for both capacities and vulnerabilities.

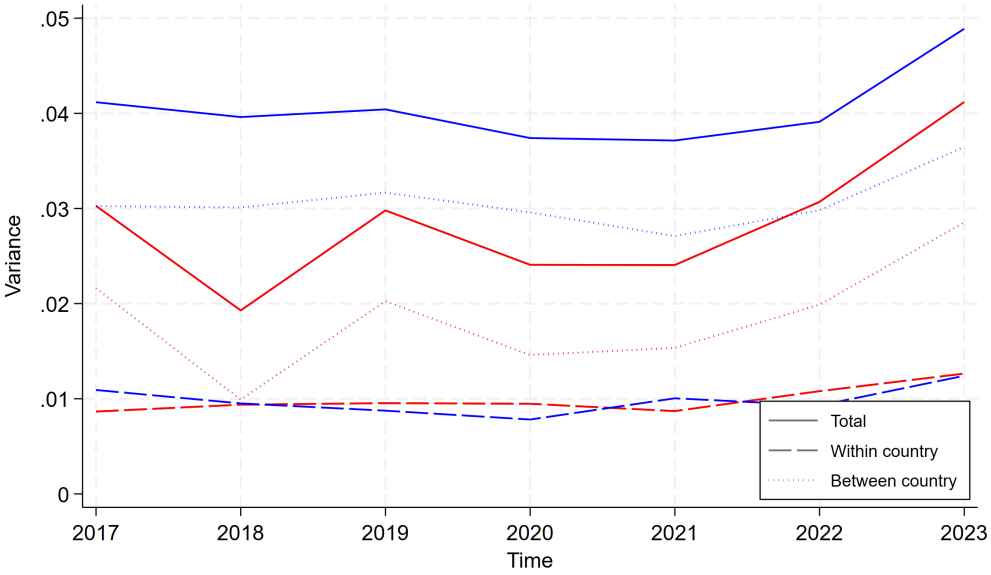

Figure 9 – Dispersion Evolution 2017- 2023

The decomposition of the variance of capacities is provided in **blue** while the variance decomposition of the vulnerability index is provided in **red.**

Source: JRC calculations.

CONCLUSION

Monitoring regional resilience in a holistic way sheds light on regions' vulnerabilities and capacities and provides potential avenues for policies to improve regions' resilience and preparedness.

Regions' vulnerabilities and capacities are strongly correlated, shaped by both structural and policy-responsive determinants. Structural characteristics—such as geographic location—are largely exogenous and fixed. In contrast, endogenous factors amenable to policy intervention—such as youth inactivity rates (NEET), levels of digitalization, and the scale of public and private investment—can significantly influence a region's resilience and development potential.

While, on average, resilience has improved slightly over the last years, there has been an increase of the inequality of the level between regions.

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[3] Hériaud, B., Joossens, E., Le Blanc, J. *A Regional Resilience Dashboard for the EU,* Publications Office of the European Union, Luxembourg, 2025, JRC141991, forthcoming.

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ACKNOWLEDGEMENTS

We would like to thank Peter Benczur, Emiliano Bruno, Jessica Cariboni, Michela Nardo and Andrea Pagano.